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Larsen, J. K.; Ouwens, M.A.; Engels, R. C. M. E.; Eisinga, R.; van Strien, T.

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## Research Report

## Validity of self-reported weight and height and predictors of weight bias in female college students

Junilla K. Larsen<sup>a,b,c,\*</sup>, Machteld Ouwens<sup>b</sup>, Rutger C.M.E. Engels<sup>c</sup>,  
Rob Eisinga<sup>d</sup>, Tatjana van Strien<sup>a,b</sup><sup>a</sup>*Institute for Gender Studies, Radboud University Nijmegen. P.O. Box 9104, 6500 HE Nijmegen, The Netherlands*<sup>b</sup>*Department of Clinical Psychology, Radboud University Nijmegen. P.O. Box 9104, 6500 HE Nijmegen, The Netherlands*<sup>c</sup>*Behavioural Science Institute, Radboud University Nijmegen. P.O. Box 9104, 6500 HE Nijmegen, The Netherlands*<sup>d</sup>*Department of Methodology and Statistics, Radboud University Nijmegen. P.O. Box 9104, 6500 HE Nijmegen, The Netherlands*

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## Abstract

Main objectives of the present study were to examine (i) the accuracy of using female college students' self-reports of weight and height in estimating rates of overweight and (ii) whether dietary restraint or Body Mass Index (BMI) was the most important predictor of weight underestimation. Participants were 209 female college students who were asked to report their weight and height on a questionnaire, while they were not told that their weight would be verified. Self-report screening was highly specific (98.9%) in identifying cases of normal weight, but only moderately sensitive (48.3%) in identifying cases of overweight. While dietary restraint was not an important predictor of weight underestimation, a higher BMI was an important predictor of weight underestimation. Our findings indicate that heavier female college students strongly underestimate their weight and that exclusive reliance on self-reports of weight and height can lead to erroneous prevalence estimates of overweight among female college students.

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**Keywords:** Weight; Self-report; Sensitivity; Specificity; Restraint

## Introduction

Increasing rates of obesity is a global public health concern in industrialized societies (James, Leach, Kalamara, & Shayeghi, 2001). Accurate monitoring of body weight is important in the diagnosis, prevention and reduction of overweight and obesity. Many studies use self-reported height and weight values to assess health and classify weight status, as it is a convenient and cost-effective method of data collection. In industrialized societies, where there is a stigma attached to being overweight, people may tend to report values of weight and height that are close to their ideal values rather than to their actual ones. Studies among both adults (Alvarez-Torices, Franch-Nadal, Alvarez-Guisasola, Hernandez-Mejia, &

Cueto-Espinar, 1993; Kuskowska-Wolk, Karlsson, Stolt, & Rossner, 1989; Niedhammer, Bugel, Bonenfant, Goldberg, & Leclerc, 2000; Stewart, Jackson, Ford, & Beaglehole, 1987; Taylor et al., 2006) and (late) adolescents (Brenner, McManus, Galuska, Lowry, & Wechsler, 2003; Elgar, Roberts, Tudor-Smith, & Moore, 2005; Goodman, Hinden, & Kandelwal, 2000; Wang, Patterson, & Hills, 2002) have shown that people generally overestimate height and underreport weight. Although the correlation between self-reported and measured height and weight is typically high, self-report data, when used to screen for overweight, fail to detect a substantial proportion of morbid cases. Sensitivity rates are specifically low among older adolescents, with two studies even reporting sensitivity rates as low as 54.9% (Brenner et al., 2003) and 52.2% (Elgar et al., 2005), missing almost half of the overweight or obese cases.

College students are frequently used in weight-related studies, and some of these studies use self-reported height

\*Corresponding author. Behavioural Science Institute, Radboud University Nijmegen, P.O. Box 9104, 6500 HE Nijmegen, The Netherlands.  
E-mail address: [j.larsen@pwo.ru.nl](mailto:j.larsen@pwo.ru.nl) (J.K. Larsen).

and weight data to screen for overweight. Hence, information on the accuracy of students' self-reports in estimating rates of overweight is important. We hypothesize that, in line with previous findings among older adolescents, sensitivity rates are low among college students. Overweight college students may probably be more aware of, and eager to adapt to, the current norms relating to body weight by virtue of their high level of education and motivation to succeed in life. Previous studies among college students have not reported about sensitivity rates as a screen for overweight. They merely focused on different situational and individual-difference variables that influence the accuracy of current weight reporting, showing that women (Betz, 1994; Imrhan, Imrhan, & Hart, 1996; Jacobson & DeBock, 2001), restrained eaters (Cash, Grant, Shovlin, & Lewis, 1992; McCabe, McFarlane, Polivy, & Olmsted, 2001; Shapiro & Anderson, 2003), heavier individuals (Cash, Counts, Hangen, & Huffine, 1989; Cash et al., 1992; McCabe et al., 2001), and individuals who are not aware that they will be weighed afterwards (Cash et al., 1989; Imrhan et al., 1996) have a tendency to underreport their weight. While one study found that with Body Mass Index (BMI) controlled, dietary restraint was no longer significantly related to underreporting (Cash et al., 1992), another study found that not BMI, but restraint status was the best predictor of weight underestimation (Shapiro & Anderson, 2003). The aims of the present study were to examine (i) the accuracy of using female college students' self-reports of weight and height in estimating rates of overweight and (ii) whether dietary restraint or BMI was the most important predictor of weight underestimation.

## Methods

### Participants and procedure

A total of 209 female students recruited at the Radboud University Nijmegen participated in the study. Participants' mean age was 20.9 years (S.D. = 2.40). They were asked to report their weight and height on a questionnaire embedded in a so-called chocolate cookie taste experiment, of which the data have already been published (Ouwens, van Strien, & van der Staak, 2003). Participants were not

told that their weight would be verified. After the chocolate cookie taste experiment, participants actual weight and height were measured with participants wearing light clothing without shoes. Height was measured to the nearest 0.5 cm, and weight to the nearest 0.5 kg. As in previous studies (McCabe et al., 2001; Shapiro & Anderson, 2003), the Revised Restraint Scale (Herman & Polivy, 1980) was used to measure dietary restraint.

### Statistical analyses

Two participants from whom self-reported weight was missing and four participants with outlying values ( $z > 3.2$ ) on differences between self-reported and measured values (+8 kg, −19 kg, +21 cm, and −13 cm) were excluded from the analyses. Paired samples of *t*-tests were used to examine differences between self-reported and measured values. Pearson correlation coefficients were computed to examine the association between measured and self-reported values. Measured and self-reported BMI ( $\text{kg/m}^2$ ) were divided in a normal ( $18.5 < \text{BMI} < 25$ ) and overweight ( $\text{BMI} \geq 25$ ) category. Sensitivity and specificity rates were used to assess the validity of self-reported weight and height data. Group comparisons were performed using chi-square test. Hierarchical multiple regression analysis was used to examine the influence of dietary restraint (step 1), measured BMI (step 2), and the interaction between dietary restraint and measured BMI (step 3) on bias in self-reported weight (the discrepancy between reported and actual weight). Prior to the regression analysis, dietary restraint and BMI were centered on their grand mean (i.e., the overall mean was subtracted from the values of a variable). An alpha level of 0.05 was used for all statistical tests. All analyses were performed with SPSS 14.0.

## Results

Self-reported weight was lower than measured weight,  $t(202) = -18.28$ ,  $p < 0.001$ , self-reported height was higher than measured height,  $t(202) = 10.49$ ,  $p < 0.001$  (Table 1). As a result, BMI scores based on self-report data were substantially lower than those based on measured data,  $t(202) = -21.04$ ,  $p < 0.001$ .

Table 1

Means, differences, and Pearson's correlation coefficients of self-reported and measured height, weight, and BMI ( $n = 203$ )

	Height (cm)	Weight (kg)	BMI ( $\text{kg/m}^2$ )
Self-reported value <sup>a</sup>	170.8 ± 6.3	62.3 ± 8.2	21.4 ± 2.5
Measured value <sup>a</sup>	169.5 ± 6.5	65.7 ± 9.0	22.9 ± 2.9
Pearson's correlation coefficient	0.964***	0.957***	0.940***
Difference between self-reported and measured data <sup>b</sup>	1.262***	−3.396***	−1.512***
95% confidence interval	1.02, 1.49	−3.76, −3.03	−1.65, −1.37

<sup>a</sup> Mean ± S.D.

<sup>b</sup> A negative value reflects underestimating and a positive value reflects overestimating.

\*\*\*  $p < .001$ .

Table 2  
Classification of sample according to measured and self-reported BMI

	Self-reported BMI		$\chi^2$
	18.5–25.0	$\geq 25$	
Measured data	18.5–25.0	$\geq 25$	
BMI: 18.5–25.0	172 (98.9%)	2 (1.1%)	76.04***
BMI: $\geq 25$	15 (51.7%)	14 (48.3%)	

\*\*\* $p < .001$ .

Table 3  
Results of hierarchical regression analysis

	Bias in self-reported weight <sup>a</sup>		$\beta$
	<i>B</i>	S.E. <i>B</i>	
Step 1			
RS	−0.71	0.33	−0.15*
Step 2			
RS	0.46	0.32	0.10
BMI	−0.52	0.06	−0.57**
Step 3			
RS	0.46	0.32	0.10
BMI	−0.55	0.07	−0.60**
RS $\times$ BMI	0.10	0.09	0.07

Note:  $R^2_{\text{adj}} = 0.02$  for step 1 ( $p < .05$ );  $R^2_{\text{adj}} = 0.27$  for step 2 ( $p < .001$ ).

<sup>a</sup>The discrepancy between actual weight and reported weight: negative value reflects underestimation and a positive value reflects overestimation.

\* $p < .05$ .

\*\* $p < .001$ .

Pearson correlations between self-reported and measured weight, height, and BMI were all high ( $r \geq 0.94$ ). When the measured value was taken as the reference, self-report screening was highly specific (98.9%) in identifying cases of normal weight, but only moderately sensitive (48.3%) in identifying cases of overweight/obesity (Table 2).

The results of the hierarchical multiple regression analysis on predictors of bias in self-reported weight are shown in Table 3. While dietary restraint was a significant predictor of bias in self-reported weight, it only explained 2% of the variance and was no longer a significant predictor after inclusion of BMI to the model in step 2. Step 2 explained 27% of the variance in bias in self-reported weight. The interaction between dietary restraint and BMI was not significant.

## Discussion

The aims of the present study were to examine (i) the accuracy of using female college students' self-reports of weight and height in estimating rates of overweight and (ii) whether dietary restraint or BMI was the most important predictor of weight underestimation. Before discussing our main findings, we will first discuss the rate of bias in self-reported weight and height among our female college students.

Although the correlations between self-reports and body measurements were high, female college students significantly overestimated their height by 1.3 cm and underestimated their weight by on average 3.4 kg. Earlier studies have found errors in self-reported height ranging from −0.04 to 2.5 cm and consistent underestimation of weight by 0.2–3.5 kg among women (Engstrom, Paterson, Doherty, Trabulsi, & Speer, 2003). Previous studies among female college students have shown mean error of self-reported height of 0 cm (Jacobson & DeBock, 2001) and 1.8 cm (McCabe et al., 2001) and underestimation of weight from −1.4 to −2.8 kg (Betz, 1994; Jacobson & DeBock, 2001; McCabe et al., 2001; Shapiro & Anderson, 2003). However, it should be noted that some previous studies among college students subtracted a constant of 1 kg, giving the fact that individuals were weighed wearing clothing. Thus, although the underestimation of weight by our female college students may be considered relatively large compared to previous findings among women from a general adult population, the rate of underestimation in our sample was rather similar compared to previous findings among female college students.

Conforming with our hypothesis, self-report screen for overweight failed to detect a substantial proportion of morbid cases. The screen missed nearly half of all cases of overweight. The high specificity and low sensitivity of the screen were similar to previous values among older adolescents (Brener et al., 2003; Elgar et al., 2005). These findings indicate that exclusive reliance on self-reports can lead to erroneous prevalence estimates of overweight among female college students.

Previous studies have shown that both heavier individuals (Cash, et al., 1989, 1992; McCabe et al., 2001) and restrained eaters (Cash et al., 1992; McCabe et al., 2001; Shapiro & Anderson, 2003) have a tendency to underreport weight. However, it is not clear whether dietary restraint or BMI is more important in the prediction of weight underestimation. Therefore, a second aim of this study was to compare the effects of dietary restraint and BMI in the prediction of weight underestimation. In line with previous studies, we found that heavier women strongly underreported their weight. Individuals reporting more dietary restraint also showed a significantly greater underreporting of body weight. However, dietary restraint only explained 2% of the variance in self-reported weight bias and did not influence self-report bias anymore after controlling for measured BMI. Although one previous study found that dietary restraint was a more important predictor than BMI in the explanation of bias in self-reported weight, in that study dietary restraint explained only 4% of the variance (Shapiro & Anderson, 2003). That is why we suggest that measured BMI is the most important predictor of weight underestimation among female college students.

Female college students who are overweight but who underreport their weight may be less likely to engage in weight control practices. Insight into multivariate psychological

factors that influence the underreport of body weight may then provide potential targets to increase the engagement for weight control strategies. Future studies should examine this.

A limitation of our study is that weight was measured to the nearest 0.5 cm instead of 0.1 cm. However, we suggest that measurement errors will be equally distributed over our sample. Although we did not tell participants that their weight would be measured afterwards, we have not directly asked them whether they were unaware of the fact that they would be weighed afterwards.

Overall, our findings indicate that heavier female college students strongly underestimate their weight and that exclusive reliance on self-reports of weight and height can lead to erroneous prevalence estimates of overweight among female college students.

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